OPERATION
AND
SERVICE MANUAL
T.O.S. NO. 136

# MODEL CDH - 3.0
# thru 12.5 MHz
# PLUG-IN
# HARMONIC MARKER

TELONIC INSTRUMENTS

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# WARRANTY

## TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INSTRUMENTS; Division of Telonic Industries, Inc. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

## CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

## RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble, plus the MODEL AND SERIAL NUMBERS of the unit must be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not. Contact TELONIC INSTRUMENTS at Post Office Box 87, Beech Grove, Indiana 46107 or your local TELONIC representative.

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## SECTION I

## GENERAL INFORMATION

1-1. SPECIFICATIONS.

1-2. Table 1-1. lists the specifications for the CDH HARMONIC MARKERS.

TABLE 1-1.

| Specifications | |
|---|---|
| Crystal Accuracy | ± 0.005% |
| Frequency Range | Fundamental to 1000 MHz |
| Marker Width | 100 to 400 KHz (Adjustable by the Sweep Generator Marker Shaper Control) |
| Marker Amplitude | Over 0.1V peak to peak at 1000 MHz (Adjustable at Marker Size Control on Sweep Generator) |
| Voltage Requirements | B+ 100V regulated dc<br>Filaments 6.3V ac |

1-3. DESCRIPTION.

1-4. The Telonic CDH HARMONIC MARKERS are crystal-controlled plug-in units for use with Telonic Sweep Generators. The marker frequency can be identified by the numerals following the letters CDH.

1-5. These units consist of a Pierce Crystal Oscillator, a harmonic generator, a mixer, and a video amplifier; all contained in one "plug-in" unit occupying two marker sockets on the Telonic Sweep Generators. The output from the oscillator is fed to a two stage harmonic generator and then to a dual diode mixer where it is combined with a signal from the sweep oscillator. The resultant heterodyne signals or "beats" are then amplified in a video amplifier and fed through a low-pass filter to the Birdy-By-Pass Amplifier in the Sweep Generator.

1-6. The crystals used in this unit are manufactured specifically for the associated oscillator circuitry. Proper allowance has been made for the capacitance of the crystal holders and other reactive properties of the oscillator section.

1-7. The dual diode mixer circuit is engineered for harmonics of nearly constant amplitude over the entire range. High order harmonics sufficiently strong for a clear marker up to 1000 MHz are available from all these units.

## SECTION II

## INSTALLATION

2-1. GENERAL

2-2. This plug-in unit can be inserted in any two of the eight plug-in sockets, built-in on all Telonic Sweep Generators, that will provide a termination for the sweep sample input and output connections. The sweep sample input (BNC jack) can be fed from either one of two sweep sample lines in the unit or from the sweep sample output of an adjacent plug-in unit. The sweep sample output (BNC plug) should be connected to either one of the two BNC terminators on the chassis or the sweep sample input of an adjacent box, to provide a 50 ohm matched termination.

## SECTION III

## MAINTENANCE

3-1. GENERAL.

3-2. Maintenance of the CDH HARMONIC MARKERS will normally be limited to replacement of component parts worn out in normal use or damaged by overload, accident, etc. Since there are no adjustable components used in this unit, the major cause of poor operation can usually be traced to a defective tube or diode.

3-3. Weak harmonic output and noise are symptoms usually indicating a defective diode. The replacement diode should have a high front to back resistance ratio if optimum results are to be realized.

3-4. TROUBLESHOOTING (Refer to Figure 1.)

3-5. Ensure that the Sweep Generator is operating properly before starting troubleshooting procedure.

3-6. Figure 2 provides typical waveforms present at the various test points indicated on the schematic diagram.

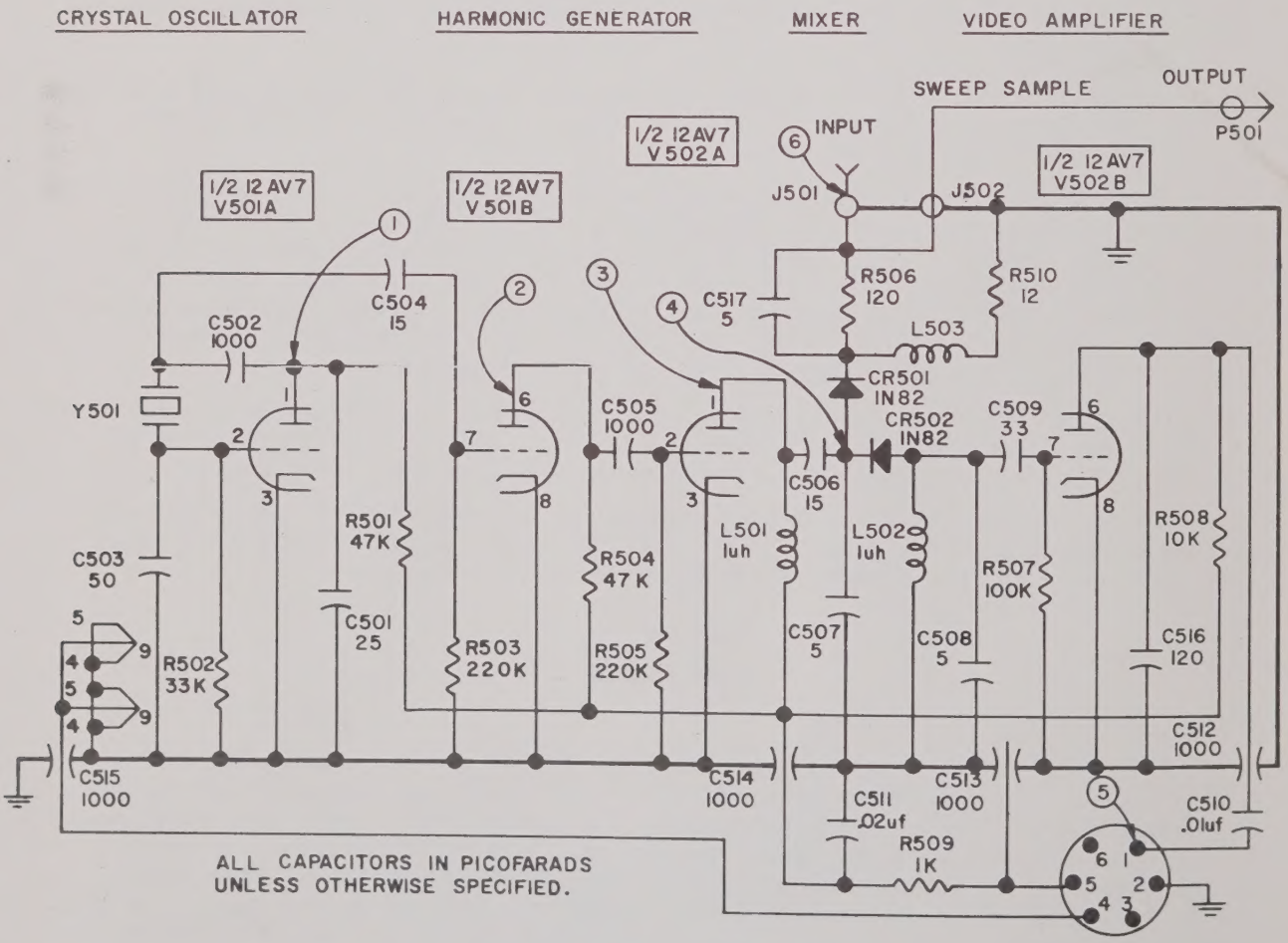



Figure 1. Schematic

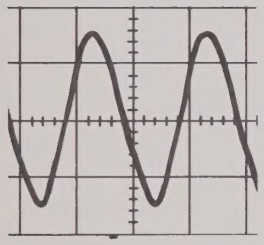
3-7. Adjust the Sweep Generator controls as follows:

a. SWEEP RATE - LINE
b. RF FUNCTION - SWEEP
c. MONITOR - RF 1
d. LEVEL - Adjust for 1V output
e. SWEEP WIDTH - 600 KHz
f. 0.1 MARKER - ON
g. POWER - ON
h. SWEEP RATIO - EQUAL
i. PLUG-IN SWEEP GENERATOR FREQUENCY - 10 MHz

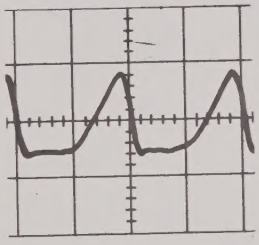
NOTE

The Telonic VR-2M Plug-in Sweep Generator was used to obtain the indicated waveforms.

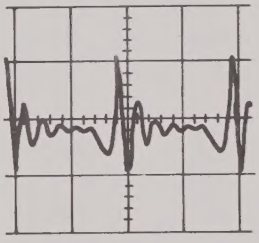
3-8. Adjust oscilloscope as indicated under the waveform.



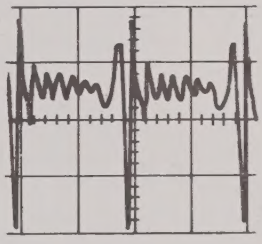
TEST POINT 1
Scale Level +40V
Vert. Sensitivity
1V/cm
Horizontal Sweep
.1 μsec/cm
Trigger-internal



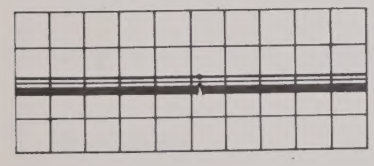
TEST POINT 2
Scale Level +50V
Vert. Sensitivity
.5V/cm
Horizontal Sweep
.1 μsec/cm
Trigger-internal



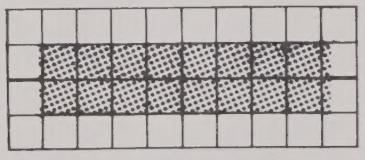
TEST POINT 3
Scale Level +95V
Vert. Sensitivity
.2V/cm
Horizontal Sweep
.1 μsec/cm
Trigger-internal



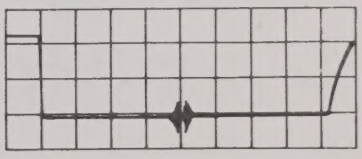
TEST POINT 4
Scale Level 0V
Vert. Sensitivity
.05V/cm
Horizontal Sweep
.1 μsec/cm
Trigger-internal



TEST POINT 5
Scale Level 0V
Vert. Sensitivity
.005V/cm
Horizontal Sweep
5ms/cm
Trigger-line



TEST POINT 6
Scale Level 0V
Vert. Sensitivity
.01V/cm
Horizontal Sweep
5ms/cm
Trigger-line



Sweep Generator Output with marker birdy indication.

Figure 2. Waveforms

# SECTION IV

# PARTS LIST

## 4-1. GENERAL.

4-2. ELECTRICAL PARTS LIST. Table 4-1. provides the complete electrical parts list for the CDH HARMONIC MARKER.

TABLE 4-1

Electrical Parts List

| Circuit Ref | Description | Typical Manufacturers | Manufacturers Part No. | Telonic Part No. |
|---|---|---|---|---|
| C501 | CFD, 25pF, 1000 VDCW | RMC | Type C | 22-0001-09 |
| C502 | CFD, 1000pF, 1000 VDCW | RMC | Type C | 22-0005-01 |
| C503 | CFD, 50pF, 1000 VDCW | RMC | Type C | 22-0002-02 |
| C504 | CFD, 15pF, 1000 VDCW | RMC | Type C | 22-0001-07 |
| C505 | Same as C502 | | | |
| C506 | Same as C504 | | | |
| C507 | CFD, 5pF, 1000 VDCW | RMC | Type C | 22-0001-04 |
| C508 | Same as C507 | | | |
| C509 | CFD, 33pF, 500 VDCW | RMC | Type C | 22-0002-01 |
| C510 | CFD, 0.01μF, 500 VDCW | RMC | Type SM | 22-0006-01 |
| C511 | CFD, 0.02μF, 500 VDCW | RMC | Type SM | 22-0007-01 |
| C512 | CFD, 1000pF, 500 VDCW | Allen-Bradley | FA5C | 21-0016-01 |
| C513 | Same as C512 | | | |
| C514 | Same as C512 | | | |
| C515 | Same as C512 | | | |
| C516 | CFD, 120pF, 1000 VDCW | RMC | Type C | 22-0002-03 |
| C517 | Same as C507 | | | |
| CR501 | DS, 1N82A | Kemtron | 1N82A | 41-0015-01 |
| CR502 | Same as CR501 | | | |
| J501 | Receptacle, Elect | Dage | UG-625/U | 44-0007-01 |
| J502 | Connector Cable | Dage | MX-1684A/U | 44-0048-01 |
| L501 | IF, 1.0μH | Wilco Corp | 205-11 | 32-0004-02 |
| L502 | Same as L501 | | | |
| L503 | * | | | |
| P501 | Plug, Elect | Dage | UG-88C/U | 44-0013-01 |
| R501 | RFC, 4.7kΩ, ±10%, 1/2W | Allen-Bradley | EB4721 | 26-0027-01 |
| R502 | RFC, 33kΩ, ±10%, 1/2W | Allen-Bradley | EB3331 | 26-0036-01 |
| R503 | RFC, 220kΩ, ±10%, 1/2W | Allen-Bradley | EB2241 | 26-0044-01 |
| R504 | RFC, 47kΩ, ±10%, 1/2W | Allen-Bradley | EB4731 | 26-0027-01 |
| R505 | Same as R503 | | | |
| R506 | RFC, 120Ω, ±10%, 1/2W | Allen-Bradley | EB1211 | 26-0016-01 |

TABLE 4-1. (Cont)

| Circuit Ref | Description | Typical Manufacturers | Manufacturers Part No. | Telonic Part No. |
|---|---|---|---|---|
| R507 | RFC, 100kΩ, ±10%, 1/2W | Allen-Bradley | EB1041 | 26-0028-01 |
| R508 | RFC, 10kΩ, ±10%, 1/2W | Allen-Bradley | EB1031 | 26-0023-01 |
| R509 | RFC, 1kΩ, ±10%, 1/2W | Allen-Bradley | EB1021 | 26-0018-01 |
| R510 | RFC, 12Ω, ±10%, 1/2W | Allen-Bradley | EB1201 | 26-0010-01 |
| V501 | TE, 12AV7 | RCA | 12AV7 | 42-0063-01 |
| V502 | Same as V501 | | | |
| Y501 | Crystal | Tedford | X-1 | 35-0001-01 |

ABBREVIATION CODE

| | |
|---|---|
| CFD | Capacitor, Fixed, Discap |
| CFCF | Capacitor, Fixed, Ceramic, Feed-thru |
| DS | Diode, Semiconductor |
| RFC | Resistor, Fixed, Composition |
| TE | Tube, Electron |
| * | No part No. assigned |

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